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FACTORS INVOLVED IN OPEN-PIT MINING AND UNDERGROUND TRANSPORT IN THE USSR

1952 ACHIEVEMENTS PORTEND BRIGHT FUTURE FOR OPEN-PIT MINING -- Moscow, Mekhanizatsiya Trudoyemkikh i Tyazhelykh Rabot, No 8, Aug 1953

The USSR coal industry has achieved considerable success in developing coal mining by the open-pit method. In 1952, coal mined by the open-pit method was at 5.5 times the prewar level, and, by the end of the Fifth Five-Year Plan, the coal output by this method will be double that of 1952. Many coal pits, for example, the Vakhrushev, Korkino, Karaganda, Volchansk, and Raychikhinsk pits, are mining tens of thousands of tons of coal daily by the open-pit method.

Methods used for working open pits are as follows:

1. The nontransport method -- The overburden is removed by excavator to dumps inside the pit.

2. The dump-conveyer method -- The overburden is carried by mobile conveying installations to dumps inside the pit.

3. Special hydrotransport method -- The overburden is removed by hydromechanics.

4. Transport method -- The overburden is removed by rail to outside dumps.

5. Combination method -- The overburden from the upper benches is removed to dumps outside the pit, but from the lower bench it is removed by excavator to dumps inside the pit.

The costs of removing one cubic meter of overburden, depending on the method used, can be indicated by data on a Raychikhinsk coal pit where a coal seam 5 meters thick was being worked:

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Method of Working	Cost Per Cubic Meter of Overburden Removal (rubles) 1950	1951	1952
Transport	4.85	5.25	5.54
Nontransport	2.38	2.71	2.80
Dump-conveyer	2.59	3.17	3.60
Special hydrotransport	5.19	3.17	3.60

A number of excavators have been designed in postwar years. Of these, the SE-3, ESh-4/40, ESh-14/65, and EGL-15 deserve special mention an machines of superior quality and considerable exploitational achievements. The performance of these machines has assured improvement in the technique of excavation. The supplementation of the stock of excavators with new ones would have two results: (1) an increase in the average bucket capacity of the excavators, and (2) a decrease in the number of types of excavators, which would facilitate the supplying of coal pits with spare parts. The following table shows the development from 1945 to 1952 in bucket capacity of excavators:

	Average Bucket Capacity (cubic meters) 1945	1950	1951	1952
Mining excavator	1.1	1.8	1.9	2.0
Overburden removal excavator	2.8	2.9	2.9	3.2

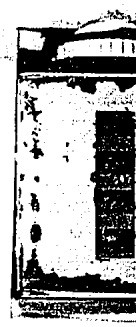
Reduction in the number of types of excavators has not yet been completed and 63 different types are still in operation in open pits.

An increase in labor productivity of the excavator brigades and the workers at the face is a direct means of increasing average bucket capacity of the excavators. Utilization of the stock of excavators has improved in the coal pits and the annual performance per cubic meter of bucket has risen. The number of working days per excavator per year has increased as shown in the following table:

Type of Work	Number of Days Excavators Operate Per Year 1940	1945	1950	1951
Coal extraction	183	250	271	271
Overburden removal	207	230	262	262

In the Korkino, Karaganda, Khramtsovskiy, and Angren pits, the number of working days per excavator amounts to 301-309 per year. Less satisfactory figures have been obtained for the Raychikhinsk, Bogoslovskiy, and Volchansk pits. The annual performance per cubic meter of bucket has increased greatly as a result of the improved utilization of the stock of excavators. The average annual removal of overburden per cubic meter of excavator capacity reached amounts shown in the table below (in thousands of cubic meters):

Excavators in Operation 1940	1945	1950	1951	1952	Total Excavators in Stock 1950	1951	1952
112.8	214.8	269.7	295.3	304.2	198.8	214.6	225.9



With regard to transport, the following measures have been found to be expedient: the use of heavy type rails; an increase in the number of crossties to 1,600-1,800 per kilometer; the laying of ballast on temporary tracks on the benches; construction between the benches and the dumps of at least double track railroad distributing stations, with equipment for capital servicing, modern means of communications, and signaling; construction of sidings on the benches for an approach to the faces; transition from low-powered O, Shch, and Tr locomotives to high-powered locomotives of the E series, and from dumpcars with a capacity of 20 tons to dumpcars with a capacity of 40 tons; and use of electric locomotives with a weight on the drivers of up to 150 tons for the transport of overburden from the lower levels.

The highest labor productivity with the least cost for overburden removal can be achieved by the hydromechanical method. However, the present techniques of this method do not answer the requirements of open-pit mining. Before the method can be extensively applied to this type of mining, suitable power-driven hydromonitors and mud pumps must be designed as well as car-mounted pumping installations to transport rock hydraulically from the face. In addition, the technology of hydromechanical operations with a high-pressure jet of water from the hydromonitor must be mastered in order to extend the scope of hydromechanics to working rock which is now considered relatively hard.

STEP UP NUMBER OF MINE CARS HANDLED BY ELECTRIC LOCOMOTIVES -- Moscow, Master Uglya, No 8, Aug 1953

Up to a short time ago, efforts in Mine No 1 imeni Chelyuskintsy of the Stalinugol' Combine were concentrated on stepping up the turnaround time of mine cars by increasing the speed on the underground railroads. Success in this was achieved as a result of a number of important measures. At the first level, heavy rails were laid, roads were divided into pickets (Russian, piket), and special workers serviced each subdivision. In electric locomotives, checks on the condition of the brakes and the sandboxes were intensified. All these measures led to the running of trainloads of coal at high speeds.

At the same time, a siding at the shaft bottom for empty cars and for a switching winch for mechanizing the moving of mine cars was lengthened. As a result, the making up of trains also proceeds at a more rapid rate.

One operator of an electric locomotive continued to seek ways of speeding up further the turnaround time of mine cars and hit upon the idea of increasing the number of mine cars in the train hauled by his locomotive. He discovered that the powerful Yu-10 electric locomotive which he drove could successfully handle up to 70 mine cars in place of the usual 35-40. Sometimes, in order to recover the empty cars more quickly, he had to take a lesser load of 50-60 cars from the incline where they were waiting, but, even so, the productivity of his locomotive had been increased an average of 43 percent.

Two other operators in the same mine are already fulfilling their norms 170 percent. Formerly four electric locomotives operated in the haulage passage of Mine No 1 imeni Chelyuskintsy and they could hardly manage their loads. At present, one of these locomotives has been declared superflous and has been placed in reserve. The three operators [apparently one operator per shift] thus freed have been transferred to other sections of underground transport. Four of the best operators handle 60-70 cars a trip and transport up to 200 tons of coal per shift.

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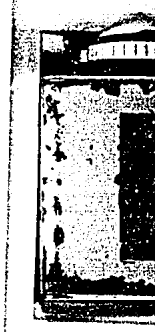

A number of other Donbass mines have been inspired by the example of Mine No 1 imeni Chelyuskintsy. An operator in Mine No 7-8 imeni Kalinin has doubled the number of mine cars handled by his locomotive. Innovators in the Makeyevka Mine imeni V. I. Lenin have decided to run trains consisting of 25 mine cars with a capacity of 1.5 tons each, instead of the former 15 mine cars. It is certain that operators capable of running heavy trains are to be found in all mines. The following necessary prerequisites must be met: sidings must be lengthened; loading points must be equipped with switching winches; and the road economy must be put in order.

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